

NOTES.

THREE British expeditions are likely to be engaged in the exploration of the Antarctic before long. In April last Dr. W. S. Bruce described his plans for a Scottish Antarctic expedition; in September Captain R. F. Scott appealed for support for an expedition which will leave London in July next; and Sir Ernest Shackleton, who has been presented with the Nachtigall gold medal of the Berlin Geographical Society, announced in a speech at Berlin on January 9 that he proposes to begin the preparations for a new expedition when he has completed his work and lectures relating to the achievements of the last expedition. Captain Scott has just received a letter from the Treasury informing him that Parliament will be asked next session to vote a sum of 20,000*l.* towards the cost of his expedition to the South Pole. The sum he asked for in appealing for funds was 40,000*l.*, and the total amount now subscribed and promised is 31,000*l.*, so there should be no difficulty in raising the additional 9000*l.* before the expedition starts. In all probability the amount originally asked for will be considerably exceeded. The expedition will sail in the *Terra Nova*, and the money already subscribed is sufficient to equip the vessel for her voyage. After departing from London the ship will call at Cardiff for coal, and will then proceed south *via* the Cape and Australia and New Zealand, and will leave the last-named place for Antarctic regions early in December. Though the undertaking is described by Captain Scott as "an all-British expedition," it is unfortunate that the announcement of the proposed Government grant of 20,000*l.* has been received with mixed feelings by geographers in Scotland. A circular letter which has reached us from Mr. J. G. Ferrier, secretary of the Scottish Oceanographical Laboratory, Edinburgh, deplores the fact that last November Dr. Bruce was refused a Government grant toward the equipment of an Antarctic expedition then being organised in Scotland, though in the words of Prof. James Geikie, president of the Royal Scottish Geographical Society, "no one is better fitted to carry such an enterprise to a successful conclusion, and the scientific results he has obtained have not been surpassed in interest or importance by the work of any living explorer in high latitudes." While we gladly acknowledge that Dr. Bruce has done splendid work in Antarctic regions with limited means, and regret that Government support for the proposed Scottish expedition has not been forthcoming, we think that in a matter of this kind it is undesirable to appeal to the Scottish public "to stand up for this and other Scottish rights." The claims of an expedition to support from the State for Antarctic exploration must surely be scientific and not political. Because we have confidence in Dr. Bruce's scientific ability and experience we trust that the funds will be provided for the expedition he is organising. Three British expeditions approaching the highest southern latitude from different bases would make for national credit and scientific progress.

THE annual general meeting of the Iron and Steel Institute is to be held at the Institution of Civil Engineers, London, on May 4 and 5, and the autumn meeting at Buxton on September 27-29 next. The council of the institute will proceed shortly to award Carnegie research scholarships, and application must be made before February 28. The awards will be announced at the autumn meeting.

A COMPANY is being formed in America by Dr. Aaron Aaronsohn, a Turkish agronomist, to investigate the agri-

culture of Palestine with the view of finding plants that will resist drought in the United States. The inquiries will be carried on through an experiment station at Haifa, which will exchange information with the Department of Agriculture at Washington.

THE death is announced at Bayonne, New Jersey, of Mr. William Abner Eddy, in his sixtieth year. In 1890, while engaged as an accountant, he began the aerial experiments which made his name widely known. These included some of the earliest attempts at photography from kites and at measuring by the same means the temperature at various heights. In 1903 he experimented with model aeroplanes dismissed from the lines of kites in mid-air. Mr. Eddy also invented various devices for measuring the tremors of the earth.

THE Civil Service Commissioners announce that an open competitive examination for not fewer than three situations as cartographer in the Hydrographic Department of the Admiralty will be held in July next, and that copies of the regulations and syllabus may be obtained at once from the secretary, Civil Service Commission, Burlington Gardens, London, W. Forms of application for admission to the examination will be ready for issue towards the end of January, and will then be obtainable on request, by letter, addressed to the Secretary of the Civil Service Commission.

THE opening lecture on January 6 of a course on parasitology, which Prof. R. Blanchard is delivering at the Paris Medical School, was made, the Paris correspondent of the *Times* reports, the occasion of a demonstration of the cordial relations existing between French and British men of science. Prof. Blanchard devoted the lecture to an account of the progress made by British men of science, and especially by the Liverpool School of Medicine, in parasitology and in the treatment of tropical diseases. Since the foundation of the Paris Institute of Colonial Medicine in 1902 through the initiative of Prof. Blanchard, friendly relations have been maintained between it and similar institutions in England and in Brussels, Hamburg, Lisbon, Naples, and Philadelphia. In 1903 pupils of the Paris institute visited the London school under the guidance of Prof. Blanchard, who has been to London and Liverpool several times. Sir Rubert Boyce, professor of pathology in the University of Liverpool, was present, and met with a flattering reception. In expressing his thanks, he dwelt on the importance of the work of Prof. Blanchard and his pupils in furthering the advance of parasitology.

BY the death of Colonel George Earl Church, on January 4, science has lost one of the most striking representatives of geographical studies in this country. He was born in Massachusetts, U.S.A., in 1835, and was educated as a civil engineer. In his twenty-third year he took part in a scientific expedition to South America, and was in later life closely associated with that continent. After distinguished service in the American Civil War and the Mexican campaign of 1866-7, he devoted himself to the problem of opening up communication between Bolivia and the Atlantic, and reached the Bolivian plateau by way of the Madeira and Mamore. Having satisfied himself that by the construction of a short line of railway round the cataracts of the Madeira a large area of Brazil and Bolivia would be opened to commerce, he obtained a concession, funds were raised, and work commenced. Unfortunately, as a result of malaria, financial and political intrigues and litigation, it was found impossible to carry

out the undertaking, and the ruins of the abandoned railway remained an object of melancholy interest to travellers until in recent years the construction of the line was once more put in hand. After a successful career, during which he was engaged in advising on or carrying into execution important operations in different parts of the world, he took up his residence in this country. He contributed some suggestive papers to the *Geographical Journal*, including one on the physical geography of South America, and as president of the Geographical Section of the British Association delivered an address on the ancient Pampean Sea of the Argentine. He will best be remembered for his contributions to the discussions of the Royal Geographical Society, in which he entertained his audience from his inexhaustible stores of personal reminiscences and historical reading. He served on the council of the society, and held at one time the position of vice-president.

THE first part of the fortieth volume of Gegenbaur's *Morphologisches Jahrbuch* contains an exhaustive treatise, by G. P. Frets, on the lumbo-sacral plexus of monotremes, which will be indispensable to all future students of this extremely variable part of the nervous system. By way of comparison, the author also deals with certain other forms, notably Sphenodon, giving a detailed account of the myology of the hinder extremity in this important type.

THE sixth part of the *Sammlung anatomischer und physiologischer Vorträge und Aufsätze*, edited by Profs. Gaupp and Nagel, consists of an interesting memoir, by Dr. H. Schridde, on "Die ortsfremden Epithelgewebe des Menschen." The author deals with epithelial abnormalities of various kinds, and endeavours to interpret them in a philosophical spirit from the points of view of phylogeny and ontogeny. His observations have thus more than a merely medical interest, although no doubt they will be appreciated mainly by the student of cellular pathology.

THE *Quarterly Journal of Microscopical Science* for December, 1909 (vol. liv., part iii.), contains the third part of Dr. Gordon Hewitt's important memoir on the structure, development, and bionomics of the house-fly. A short account is given of the part played by flies in the dissemination of disease, which we could wish to see re-published in a popular form and distributed broadcast. It is difficult to exaggerate the danger to which human beings expose themselves by uncleanly habits in relation to filth, food, and flies, and it is equally difficult to comprehend the indifference which even "educated" people show on this subject—except as the result of gross ignorance and want of observation. The information which Dr. Hewitt has collected with regard to the mutual relations of flies and soldiers in camp, and flies and typhoid patients in hospitals, ought to be sufficient to convince anybody who does not at once set it aside as too nasty for consideration. Unfortunately, the study of nastiness is a necessary preliminary to its removal.

IN view of the renewed interest which has lately been manifested in the difficult problem of the origin of vertebrates, zoologists will welcome Prof. MacBride's contribution to the subject in the *Quarterly Journal of Microscopical Science* (vol. liv., part iii.). Though dealing primarily with the formation of the layers in *Amphioxus*, this paper includes a discussion of the corresponding processes in the higher vertebrates, with special reference to the views recently expressed by Prof. Hubrecht, with which Dr. MacBride by no means agrees. We must note the addition of two new inmates to the zoological Noah's

Ark of imaginary animals, viz. the "Pleuronectid" ancestor of *Amphioxus*, which, with a number of enormous round holes on its flattened back to represent gill-slits, appears none too well adapted to its environment, and "the common ancestor of *Vertebrata*, *Enteropneusta* and *Echinodermata*," which looks like a mixture between several well-known larval forms. Whatever reception they may accord to these imaginary ancestors, however, most zoologists will probably be grateful to Dr. MacBride for his expressed opinion that, "in starting with *Mammalia*, and reading their complicated processes into the development of lower *Vertebrata*, Prof. Hubrecht has read the book of vertebrate development upside down."

A copy of the Johns Hopkins University Circular, Medical Department, has been sent to us. It corresponds to our calendars or prospectuses, and contains full details of the courses of instruction given, with fees and timetable, and a list of graduates, endowments, publications by graduates, &c. It is published by the University, and can be obtained on application to the registrar.

BULLETINS Nos. 11 and 12 of the Sleeping Sickness Bureau have been issued, and contain full and useful summaries of various papers on trypanosomes and trypanosome diseases, and their agents of transmission. We would suggest that it would be a convenience to readers if the bulletins were issued with cut edges. The director will be glad to receive early copies of authors' papers for notice and for the library of the bureau.

WE have received a reprint of an article by Arthur Macdonald from the *Journal of Inebriety*, Boston, 1909, on the statistics of alcoholism and inebriety, which gives a useful summary for various countries. We are surprised to see it stated that drunkenness in London has risen from 537 to 566 in 1890-5 to 898 in 1904 and 859 in 1905 per 100,000 of population. Certainly the police-court records show the reverse, viz. a decline in drunkenness.

THE Johns Hopkins Hospital Bulletin for December, 1909 (xx., No. 225), contains another contribution on the subject of the ancient medical writers, essays on which have appeared in that journal from time to time. Prof. Eugene Cordell writes on *Aretaeus*, the Cappadocian who lived probably in the second century of the Christian era, about the time of Galen. Many of his works are now lost, but such as remain portray very exactly the symptoms of disease, e.g. tetanus, epilepsy, and hysteria. He recognised the "murmur" of heart disease, and treated phthisis by life at sea.

IN a leaflet entitled "A Plan for the Study of Man," by Mr. Arthur Macdonald (from the Proceedings of the Imperial Academy of Sciences, St. Petersburg), an apparatus for the measurement of pain is described. This "temporal algometer" consists of a brass cylinder with a steel rod running through it. The rod is supported by a spring, so that varying pressures from 0 to 4000 grams may be applied, the amount being indicated by an attached scale. The rod has a disc 15 mm. in diameter, and covered with flannel at the end. It is applied over the temporal muscle; as soon as the subject feels the pressure to be in the least disagreeable, the amount of pressure applied is read on the scale.

WE have pleasure in directing attention to the artistically designed "Nature Calendar" published by Messrs. George Philip and Son, Fleet Street, E.C., at the modest price of sixpence. Horticultural notes, observations on the movements of birds, and hints for the collection of Lepidoptera are the features of this year's issue. Special notes

for the months refer to varying aspects of the weather in relation to outdoor phenomena and animate nature. The calendar is very suitable for the study and class-rooms where natural science is taught, both for the information supplied and as a suggestion for children to draw up a calendar for themselves.

OWING to the want of agreement between recent investigators of species of *Isoetes*, any additional information derived from the examination of different species, as the account by Miss A. G. Stokey in the *Botanical Gazette* (April, 1909), is of direct interest to botanists. The anatomy of four American species was investigated. The chief point of originality lies in the interpretation of the so-called "prismatic layers" formed centripetally by the cambium; the author dissents from the explanation, first offered by Russow, that certain of these cells are phloëm elements, but regards the whole of the prismatic layers as secondary xylem. With respect to the phylogenetic position of the genus, the author favours affinity with the *Lepidodendraceæ*, on the ground of morphological characters.

THE identification of the lichens collected during the second Norwegian Arctic Expedition in the *Fram*, 1898 to 1902, chiefly by Mr. H. G. Simmons, was entrusted to Dr. O. V. Darbshire; the results are embodied in Report No. 21 of that expedition, together with a systematic enumeration of all the species—about 500—recorded from the Arctic regions exclusive of Alaska. The material brought on this journey from Ellesmere Land and King Oscar Land yielded more than a thousand specimens, from which 161 different species have been obtained, including the types of eight new to science. The fruticulose lichens play an important part in the vegetation; the various species of *Cetraria* occur in large quantities over wide areas. It is noted that no specimen of the reindeer moss was collected. The author institutes a comparison between the lichen flora of the Arctic regions, Germany, and the Tyrol to point out that nearly three-fourths of the species are found in the Tyrol and two-thirds in Germany.

THE *Kew Bulletin* (No. 9) opens with an article by Mr. W. J. Bean providing garden notes on some of the newly introduced trees and shrubs collected by Mr. E. H. Wilson in western and central China at elevations ranging from 2500 feet to 10,000 feet. A primary object of Wilson's expeditions was to introduce ornamental horticultural novelties in the shape of arborescent plants that would be hardy in the British Isles. Many of the plants raised from seed have already survived the rigours of more than one English winter. The plants selected for description are almost entirely monotypic genera. Another article by Mr. Bean refers to the Canadian wild rice, *Zizania aquatica*, recommending it for trial as an ornamental plant in ponds and backwaters. It is an annual requiring plenty of sunshine, and it is especially necessary to keep the seeds moist between collection and sowing. Dr. O. Stapf contributes an article on the perennial species, *Zizania latifolia*, which is cultivated in China for use as a vegetable, but cannot be recommended as an ornamental plant.

THE annual report from the Experiment Station, Tortola, Virgin Islands, records a year of steady progress. In the cotton industry the export of lint amounted to 52,528 lb., an increase of 2500 lb. over the preceding year. A lime industry on similar lines to the cotton industry has also been successfully started, the fruit being purchased from peasants at the experimental station. The Agricultural Department not only gives advice and assistance, but forms a direct market for much of the produce raised in the islands.

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LUCERNE-GROWING in South Africa has, according to the *Agricultural Journal of the Cape of Good Hope*, recently suffered from a stem-infesting nematode, viz. *Tylenchus dipsaci (devestatrix)*, which has hitherto not appeared in South Africa, although well known in Europe. The adult worm is a fifteenth of an inch long, and produces characteristic distortions and discolorations in the plant. Infested shoots only grow out a few inches; the whole plant languishes and dies in the course of about a year. The infection spreads in a variety of ways, and in time the entire crop is so badly attacked as to be not worth cutting or feeding off. Up to the present no successful means of combating the pest is known.

THE *Agricultural Journal of India*, issued from the Research Institute, Pusa, differs from most of its kind in that it is intended for the intelligent non-technical reader and therefore appeals to a wider class than the more technical memoirs issued from the same institute. One of its most interesting features is the description of native methods of cultivation, management of crops and of stock. In the current issue the Kachin cultivation of tea is dealt with. In other articles an extension of the area under fibre plants is urged, and methods of growing lucerne are described. Mr. Maxwell-Lefroy has a suggestive paper on the cultivation of shellac. The scale-insects of the genus *Tachardia*, which form shellac as a resinous covering, live on a variety of trees and suck out the sap; they occur to a very great extent in Indian forests, and are, indeed, already cultivated to some extent.

THE reports on the Botanic Station Experiment Plots and Agricultural Education, Antigua, are to hand. There has been a shrinkage in the number of acres planted in cotton in the island to one-third what it was last year, chiefly because of bad seasons and insect pests. Details are given of experiments with sweet potatoes, yams, and other crops. The sugar-cane experiments are carried out on an extensive scale, there being more than 1100 plots of varieties of canes and 256 plots of manorial experiments. Some interesting results are expected from the work on limes and broom-cotton. A new industry, the production of cocoa-nuts, has been started and promises success in certain districts where the conditions are favourable. The report from St. Kitts-Nevis also shows a great amount of activity; the principal industry being sugar production, much attention is given to experiments with the sugar-cane. A good deal of work is being done in cotton, now an established industry in the presidency, and likely to be of considerable economic importance. The report from Grenada deals with cacao, rubber, Sea Island cotton, and other crops. Some interesting experiments are recorded on mulching cacao, but the problem is not yet solved, because of the difficulty of getting plants to grow in the shade of a cacao plantation.

ATTENTION is directed in a recent number of the *Agricultural News* to the fact that about 20 per cent. of the bananas grown in banana-producing countries are unfit for export, and are often completely wasted. Attempts to make a saleable product by drying the fruit and producing banana flour have been only partially successful. Experiments made at the Central Laboratory, Guatemala, described at length in the *Journal d'Agriculture Tropicale*, have shown how to obtain from this waste material a spirit resembling whisky in flavour. The yield of spirit from each bunch of bananas is estimated at 4½ litres, and the cost of manufacture is said to be much less than that of whisky. Over a period of two years the process has proved to be a commercial success. A very similar

problem is discussed in the *Journal of Agriculture of South Australia*. The production of raisins has exceeded the local consumption, and as there is no prospect of a successful export trade, some new outlet has to be found. Experiments have therefore been made to ascertain whether raisins could be utilised in satisfying the local demand for strong spirit. Prof. Perkins's results led him to conclude that 150 to 154 gallons of proof spirit might be obtained from a ton of first-grade raisins, and 130 to 134 gallons from a ton of second-grade raisins, and he adds that on this basis raisins should be worth to the grower not much less than 20d. a ton.

BULLETIN No. 399 issued by the United States Geological Survey contains results of spirit-levelling carried out by the Survey in western Virginia during the years 1896 to 1908, with the cooperation of the West Virginia Geological Survey after 1901. The results have been compiled by Messrs. S. S. Gannett and D. H. Baldwin, and include all previously published data along with the newer observations, re-adjusted and re-arranged by quadrangles. Descriptions and elevations of bench-marks are given for forty-eight counties, furnishing vertical control for nearly half the State.

In a paper published by the Department of Agriculture and Technical Instruction for Ireland (Fisheries, No. 7) Mr. C. M. Cunningham discusses the results of investigations on the drift of the Irish Sea made with floats of various kinds. The floats were distributed by making use of the many steamship lines radiating from Belfast and crossing different parts of the area under examination, and the experiments extend from June, 1903, to May, 1906; the total number of floats distributed was about 1200, and almost exactly half these have been found and the cards returned. The general result suggested is that there is a northward drift throughout the year, modified by a southward tendency during certain states of the weather, especially during the months of March, April, May, and June, when northerly winds are most apt to assert themselves. No instrument distributed north of a line joining Cork Harbour and the Land's End has been found to the south of it.

MR. D. W. JOHNSON contributes an interesting study of hanging valleys to the Bulletin of the American Geographical Society. Excluding the types of hanging valleys which are not definitely related to a main stream and its tributaries, as, for example, the valleys left hanging by the encroachment of the sea on south-east England and north-western France, and valleys raised above the level of adjacent plains by up-faulting, the author discusses the questions:—(1) are hanging valleys a trustworthy indication of glacial erosion of the main valley? and (2) may not hanging tributary valleys result from glacial widening of the main valley, instead of from glacial deepening? The investigation goes to show that hanging tributary valleys may be produced independently of glacial erosion, but valleys of this type are of rare occurrence, and that wherever the mouth of a hanging valley has been materially altered to the typical glacial trough form we must infer a greater or less amount of glacial deepening.

FROM the Survey Department of Egypt we have received a copy of "An Almanac for 1910," compiled at the Offices of that department, and published by the National Printing Department, Cairo, at the price of 25 millièmes (6d.). For anyone at all interested in Egyptian affairs this almanac is full of interesting information concerning the various Government departments and services, the railways, telegraphs and population, the meteorological elements and the rise of the Nile at various places, the

geographical coordinates of the principal towns, &c. General and scientific matters are also well represented by conversion tables, ephemerides, &c. The ephemeris for Halley's comet is accompanied by figures showing its brightness on different dates and its times of rising and setting. A comprehensive index concludes this cheap and useful work.

AN interesting article, by Mr. R. H. Curtis, on the development and standardisation of sunshine recorders appears in *Symons's Meteorological Magazine* for November and December, 1909. The instrument first in use consisted of a hemispherical wooden bowl with hollow glass ball filled with water, invented by Mr. J. F. Campbell about fifty-six years ago, in which the charred wood gave a six-months' record, from solstice to solstice. A regular daily record was first obtained at Greenwich Observatory in 1876 by using a metal bowl, presented by Sir W. Armstrong, and a narrow strip of blackened card. So far as ordinary observers were concerned, there was some difficulty in the adjustment of the card, but this was overcome by Sir G. G. Stokes in 1879, who developed the Campbell-Stokes recorder and cards now in general use; only some trivial additions for adjustment have been made since, one of which is due to Mr. Curtis. Owing to the cost of this instrument, Mr. J. B. Jordan introduced a very ingenious photographic recorder in 1885, but the two forms of instrument do not register precisely the same thing, and after careful comparisons had been made of the results, the Meteorological Office decided to publish only the records of the burning instrument. A report upon the instruments is contained in the Quarterly Journal of the Royal Meteorological Society (vol. xxiv., p. 1), and the specification for the standard instrument has, with slight variation, been printed in the "Observer's Handbook," published by the Meteorological Committee. For obtaining uniformity of results, Mr. Curtis lays great stress upon the necessity of using cards of colour and texture similar to patterns preserved in the Meteorological Office. Other recorders, not in such general use, are not referred to in this article.

BULLETIN No. 395 of the U.S. Geological Survey contains an elaborate investigation, by Profs. Schlundt and Moore, of the radio-activity of the thermal waters of Yellowstone National Park. One of the most interesting points brought out is that the travertine of the old terraces contains very little radium as compared with that of more recent formation. The authors interpret this to mean that the hot water has effected a chemical separation between radium and its parent uranium, carrying off and depositing the former only. In course of time the radium in the travertine decays, and is not replaced by a fresh growth, as in normal radio-active minerals. Since some of the travertine is overlain by glacial boulders, this obviously gives a method of dating the Ice age in this district if the accepted rate of decay of radium be assumed and if we suppose that the material discharged by the spring has been of uniform quality throughout the interval. The figure at which the authors arrive is 20,000 years.

THE *Physikalische Zeitschrift* for December 15, 1909, contains a paper by Dr. J. J. Kossonogow, of the University of Kiev, on the application of the ultramicroscope to the study of the phenomena of electrolysis. He finds that when an electrolyte is examined under the ultramicroscope, at the moment the current is switched on there appear in the field of view a number of bright points of light which travel towards the electrodes with velocities of the same order of magnitude as have been found for

the ions. The path may be deviated by means of a magnet. When a point reaches an electrode it appears to attach itself and take a crystalline form. None of these appearances is observed in the case of a non-electrolyte, and the author considers he has proved beyond the possibility of doubt that the ultramicroscope provides a powerful means of studying directly the motions of the ions in electrolysis.

A SEPARATE copy has reached us of Prof. Zeeman's paper on the degree of completeness of the circular polarisation of magnetically divided lines, which was communicated to the Academy of Science of Amsterdam on October 30, 1909. It will be remembered that a luminous gas in a strong magnetic field gives a spectrum which, when viewed along the lines of the field, consists in the simplest case of two lines, which according to Lorentz's elementary theory of their production should be circularly polarised, one right-, the other left-handed. On examination of lines which normal to the field become triplets, quartets, sextets, and nonets, Prof. Zeeman finds that in each case, whether along the field a line becomes a doublet or a quartet, the lines so produced are circularly polarised, and the degree of circular polarisation found approaches more and more to completeness as the intensity of the light transmitted by the instrument increases. The orbits of the electrons in planes perpendicular to the magnetic field are therefore almost exactly circular.

IN an article in *Engineering* for December 31, 1909, on the command of the air and its effect on land warfare, some interesting points are dealt with. We may probably quite disregard the idea of balloons being used to drop bombs into towns for the sake of wantonly destroying private property. There are other and more legitimate ways in which the command of the air may probably be the deciding factor in a war. There is the facility it gives for ascertaining an enemy's disposition and movements, and flying machines may be of great use in war by acting on an enemy's communications. There is no reason why such machines should not start from a ship as well as on land, and, if capable of flying 300 miles, would have a striking distance of 150 miles inland from an enemy's coast. At present it looks as if the aéroplane rather than the navigable balloon would become universal, owing to its being faster, quicker at turning, harder to hit, and very much cheaper.

IN an article on latter-day developments of the American locomotive in the *Engineering Magazine* for December, 1909, Mr. H. Keith Trask deplores the fact that American locomotive practice has followed rather than led European practice in matters of design relating to increased efficiency from the standpoint of economy. Thus European designers had long considered the advantages offered by superheated steam before the question was seriously taken up in America. Cheap American fuel was responsible for this neglect, but the recent developments of the compound locomotive have rendered the American designers alive to the benefits resulting from the use of superheated steam. As developed for use on American railroads, the superheater is of two types, the smoke-box and the fire-tube. While both types were originally introduced several years ago, it is only within the past twelve or eighteen months that the American railroad world in general has awakened to their possibilities, and they are being applied to many new engines now building for various roads. The Canadian Pacific was the first road to adopt the fire-tube superheater exclusively, and the Santa Fe, although not the first road to test the smoke-box design, was the pioneer in adopting this device as a standard.

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ONE of the chapters in the recent report of the U.S. Commissioner of Education deals with education in Central Europe. Among much other information of interest in this chapter is a reference to the attempt of Prof. Du Bois-Reymond, in his work on inventions and inventors, to prove that inventive productivity in different countries depends on social factors. General education, density of population, transportation facilities, social organisation, and so on, he maintains, determine this productivity, and despite the participation of working men in State affairs comparatively few patent applications come from them. The result of an inquiry made in 1900 shows that in England 15,300 applications for patents were made, or 37 to every 100,000 of inhabitants, and that the percentage of illiteracy was 3.7. In the United States the corresponding numbers were 22,900, 30, and 6.2, the percentage of illiteracy in this case being of the white population above ten years of age. In Germany the numbers were 14,800, 26, and 0.05. In France, however, only 7020 patents were applied for, or 18 per 100,000 inhabitants, the percentage of illiteracy being 4.6. The numbers in Italy, again, were 1030, 3, and 33.8 per cent. of illiteracy. Race characteristics, in other words, do not predetermine the inventive productivity of a country, nor does the high proportion of literates, but social factors, especially the high status of industry, do determine it. England, the United States, and Germany, the countries having the best developed systems of industry, are the most productive in inventions. Germany alone had, in 1900, 1500 patent applications concerning technical contrivances relating to electricity.

OWING to the death of the late Colonel Bingham, editor of the "Fauna of British India," no volume of the series has been issued for some time. This month, however, Mr. Malcolm Burr's half-volume on the earwigs of British India will appear, which is the first monograph on the Dermaptera which has been published since De Borman's monograph in "Das Tierreich." It will contain a description of a number of new and recently established genera, and will be well illustrated.

OUR ASTRONOMICAL COLUMN.

HALLEY'S COMET, 1909.—Some interesting measures of Halley's comet, made with the micrometer of the Yerkes 40-inch refractor, are published by Prof. Barnard in No. 605 of the *Astronomical Journal*. With this large telescope the comet was quite an easy object, and the measures should be good; but, as Prof. Barnard suggests, the edges of such a nebulous body are not easy to set on.

The measures extend up to November 30, 1909, when the estimated magnitude was about 11.0, and the comet showed a condensation of some 7" diameter. The diameter of the whole object was 41", and possibly an ill-defined nucleus was seen, but this feature was very doubtful. From September 17 to November 14 the measured diameters, reduced to miles, ranged from 16,400 to 9200 miles, the mean being 12,600 miles, or about $1\frac{1}{2}$ times the earth's diameter.

At the December (1909) meeting of the Royal Astronomical Society, reported in No. 418 of the *Observatory*, the Astronomer Royal announced that a photograph secured with the Reynolds reflector at Helwan, on August 24, shows the comet's image; its position agrees within 0.12s. in R.A. and 1.7" in declination with the position calculated from the Cowell-Crommelin orbit corrected by the Greenwich observations. Messrs. Keeling and Knox-Shaw are to be congratulated heartily upon securing the first known photograph of the comet.

In No. 25 of the *Gazette astronomique*, Signor Pio Emanuelli discusses the probable encounter between the earth and the comet's tail in May next. At 10 a.m. (G.M.T.) on May 18 the comet will pass the descending